POPULATION OCCUPIED IN AGRICULTURE AND AGRICULTURAL PRODUCTION VALUE IN ROMANIA, 2008-2020

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Abstract

The paper analyzed rural population, rural working age population, civil population occupied in agriculture and agricultural output value using the data from National Institute of Statistics for the period 2008-2020. Trend line, regression equations, coefficient of determination, Spearman's rank correlation coefficient represented the methodological means for processing the data. Romania had still a high labour resource accounting for 6.23 million persons in 2020, by 10% more than in 2008. In the period 2008-2020, the population able to work declined in almost all the regions, except North East and Bucharest Ilfov, but, the rural population having the age to work increased in various proportions in all the regions. However, civil population occupied in agriculture declined by -30% from 2,407 thousand persons in 2008 to 1,681 thousand persons in 2020. Population aging and migration are the main causes of this decrease. The decline in the territory ranged between -31.3% in North East and -25% in Bucharest-Ilfov. Agricultural production value increased by +21.6% from Ron 66,993 Million in 2008 to Ron 81,400 Million in 2020. In 2020, the highest agricultural output value was achieved in South Muntenia, North East, North West, South West Oltenia, South East. Analyzing the linear dependency between the ranks of civil population occupied in agriculture and agricultural output value, we noticed that in 2008, it was not found such a connection, as Spearman's correlation coefficient was $r_S = 0.1004$, $t_{crit\ 6;0.05}$ was 1,943 and $R^I = 0.4748 < 0.1943$. However, in 2020, between the ranks of the two studied indicators was found a linear dependency reflected by $r_S = 0.739$, $R^I = 2.26$, $t_{crit\ 6;0.05}$ was 1,943, therefore $R^I > t_{crit}$. As a final conclusion, while the population occupied in agriculture decreases, agricultural production value increases due to the decline in civil population occupied in this economic sector caused by aging and migration, increased performance in agricultural production, grace to technological progress and a better farm management, price volatility for agricultural products, financial support according to the CAP of the EU and Romania's Government.

Key words: occupied population, production value, agriculture, Romania

INTRODUCTION

Labor force is one of the major production factors in all the fields of the economy. In agriculture, due to the specificity of production processes, it is a mixture of production factors where, beside labor force, it is needed land (soil with its characteristics and quality, surface, property), fixed capital (machinery, equipment, farm buildings etc), working capital (current assets), technologies, innovations, investments and climate conditions [4, 10].

The main labor resource in agriculture is provided by rural population [16]. Romania has a high share of the rural population, accounting for 46% in the total number of inhabitants [1, 2].
The EU average is 4.4%, but there are countries with a higher share like Romania, Poland, Bulgaria, Italy and Spain, and also countries with a lower share like France and Hungary [9, 14, 17].
Despite its high number, rural population has specific demographic features among which the most important ones are: aging as young

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generation is more and more attracted by professions and jobs in the urban areas or to travel for work abroad; also, a high mortality rate and low birth rate, poverty, low training level and low living standard [1, 7, 15, 26, 29].

Income level is small in agriculture creating a gap against the income level of the employed people in the cities [16, 26, 27].

However, during the last decades, rural tourism and agrotourism have become an alternative for additional income for the rural population [5, 6].

In agriculture there is a low number of salaried persons, but the non salaried persons are more numerous (patrons, self-employed workers, unpaid family workers, members of cooperatives etc) [13, 14, 25].

Also, labor productivity is lower in Romania compared to the one in other EU countries [19, 20, 21].

Agriculture performance in terms of yield is low in Romania because of farm structure, dominated by small sized farms, the majority being subsistence and semi-subsistence farms. Large agricultural holdings represent about 1% of the total number of farms accounting for 3.2 million. But they work about a half of agricultural land [1, 2, 3, 14].

However, agricultural production value increased and Romania is an important contributor to the EU agricultural output value [12, 23, 24].

Despite that agricultural production value and also gross value added in agriculture increased, their value per ha utilized agricultural area is smaller than in other EU member states [14].

Agriculture contributes by 4.2% to Romania's GDP, this percentage being higher than in other EU countries [18, 22].

In the territory, there are discrepancies regarding rural population, employed and not employed population in agriculture, and agricultural production [5, 8, 28].

In this context, the purpose of the paper was to study the changes in rural population occupied in agriculture and agricultural production value, the link between these two indicators in Romania during the period 2008-2020, pointing out the discrepancies in the

territory among micro-regions of development.

MATERIALS AND METHODS

Data collection

To set up this paper, the empirical data were collected from National Institute of Statistics for the period 2008-2020 regarding the following indicators:

- Civil occupied population at the national level, of which in the rural areas and also in the territory in the eight micro-regions of development: North West (NW), Center (C), North East (NE), South Muntenia (S Munt), Bucharest Ilfov (Buc If), South West Oltenia (SW Olt), West (W);

- Agricultural output value at the national level and also in each region of development.

Methodological aspects

The methodology used to process the data included:

-*Fixed basis index*, $I_{FB} = (X_n/X_1) \times 100$, used to quantify the increase/decrease in 2020 compared to 2008 level;

-*Regression equations (linear and polynomial) and coefficient of determination* to emphasize the trend line and the determination degree of the variation for the dependent variable caused by the variation of the independent variable across the analyzed period;

- *Spearman's rank correlation coefficient, r_S,* which was used for determining the strength and direction of the relationship between the two analyzed indicators, using the formula:

$$r_S = 1 - \frac{6 \sum d_i^2}{n^3 - n} \qquad (1)$$

where:

d_i^2 is the difference square and n is the number of micro-regions in Romania, that is 8. The values of r_S range between +1 and -1. A value closer to +1 reflects a positive association of the ranks and a value closer to -1 shows a negative relationship between the ranks of the studied indicators.

The significance of r_S was tested using " t-test", according to the formula:

$$R^I = r_S \sqrt{\frac{n-2}{1-r_S^2}} \qquad (2)$$

The calculated R^I was compared with the "t_{crit}" value for df = n -2 = 6 and for α = 0.05 (95%) significance level.

The hypothesis of the study was:

H_O: There is no monotonic association between the two indicators, that is between agricultural production value and civil population occupied in agriculture.

H_1: There is a monotonic connection between the two indicators.

The interpretation of the results after making "t- test" was:

- if R^I < "t_{crit}" in one-tailed column for α = 0.05, then we accept the H_0, meaning that there is no monotonic relationship between the two indicators, there is no a linear dependency between them and r_S is deemed irrelevant;

- if R^I > "t_{crit}" in one-tailed column for α = 0.05, then H_O is rejected and H_1 is accepted, meaning that there is a monotonic link between the two indicators, a linear dependency and the value of Spearman's correlation coefficient is considered relevant.

-*The relative distance method from the highest performance* was utilized to establish the hierarchy of the micro-region according to the level of agricultural production value.

The results were tabled and illustrated in graphics for a easier and better understanding of the dynamics and relationships between the two indicators taken into consideration.

Finally, the main conclusions were drawn and presented at the end of the article.

RESULTS AND DISCUSSIONS

Rural population and working age population in Romania's agriculture

Romania is a country with a high percent of population living in the rural areas. On 1st July 2020, of 22,089,211 inhabitants, a number of 9,646,940, represented the rural population accounting for 43.6% and this figure is the highest among the EU member states.

The dynamics of the rural population in the period 2008-2020 shows that in 2020 it was registered a slight decline from 9,743,696 persons in the year 2008 to 9,649,738 in 2020, meaning by - 0.01% less.

Regarding the dynamics of the working age population in the analyzed period, 2008-2020, we may affirm that in 2020, at the national level, the number of the people having an age suitable to work accounted for 14,605,601 persons, reflecting just a +0.3% increase in the year 2020 versus 2008, meaning a relatively stable situation.

However, in 2008, the rural working age population accounted for 5,661,263 persons, while in 2020 it increased to 6,231,928 persons, meaning by +10.08%.

Therefore, the share of rural working age population in rural population increased from 58.1% in 2008 to 64.58% in the year 2020.
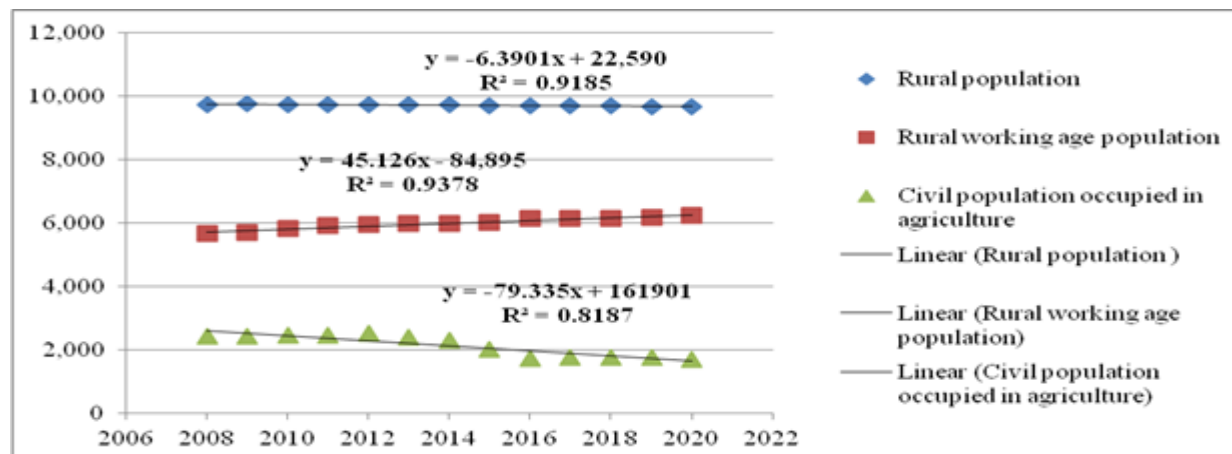

Fig. 1. Dynamics of rural population, rural working age population and civil population occupied in agriculture, Romania, 2008-2020 (Thousand persons)
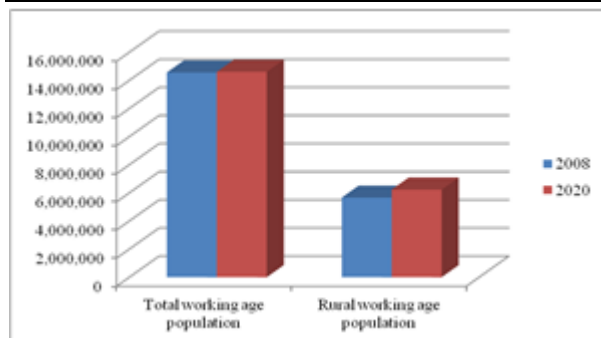Source: Own design based on NIS data, 2021 [11].

Fig. 2. Working age population in Romania, 2008-2020 (persons)
Source: Own design based on NIS data, 2021 [11].

In 2020, rural working age population represented 43% of working age population at the national level (Fig. 1 and Fig. 2). The dispersion of the working age population in the territory by micro-region is presented in Table 1. The data show that in the year 2008, the order of the micro-regions based of the number of persons having the age to work in the rural areas was: North East, South Muntenia, with the highest number of the population over 1.1 million, North West and South East with a population of 752 thousands persons in South East to 750 thousands in North West, 655 thousands in South East Oltenia, followed by the Central region with 616 thousands and West with 433 thousands and finally, Bucharest Ilfov with only 107 thousand persons. Therefore, it is a large variation of labour resource from a region to another. Of the total working age population in the rural areas, 52.2% is concentrated in South Muntenia region, followed by North East 49.5%, South West Oltenia 44.8%, North West 41%, South East 38.1%, Center 35.5%, West 32.1% and Bucharest Ilfov 6.3% (Table 1).

Table 1. Working age population by micro region in Romania in 2020 versus 2008 (Thousand persons)

	2008			2020		
	Total working age population	Rural working age population	% rural population in total	Total working age population	Rural working age population	% rural population in total
North West	1.849	760	41.08	1,868	834	44.91
Center	1,735	616	35.54	1,710	681	39.84
North East	2,442	1,209	49.50	2,661	1,413	53.12
South East	1,919	752	38.17	1,854	810	43.70
South Muntenia	2,126	1,111	52.26	2,054	1,153	56.15
Bucharest Ilfov	1,680	107	6.37	1,720	165	9.57
South West Oltenia	1,462	655	44.84	1,415	680	48.01
West	1,347	433	32.12	1,324	490	37.01

Source: Own calculation based on NIS data, 2021 [11].

In the year 2020 compared to 2008, at the country level it was noticed a decline in working age population in the Central, South East, South Muntenia, South West Oltenia and West, while in North West, North East, Bucharest Ilfov, the population able to work increased. At the same time, it was noticed an increase of the rural working age population in the same interval. In 2020, the decreasing order of the micro-regions based on the share of rural population able to work in the total working age population was as follows: South Muntenia 56.1%, North East 53.1%, South West Oltenia 48%, North West 44.9%, South East 43.7%, Center 39.85, West 37% and Bucharest Ilfov 9.6%.
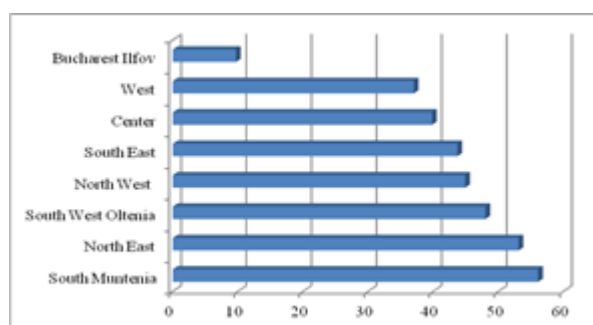

Fig. 3. The share of rural working age population in total working age population by region in the year 2020 (%)

Source: Own calculation and design based on NIS data, 2021 [11].

Regarding the distribution of working age population in the rural areas it was noticed the maintenance of the same hierarchy in 2020 compared to 2008 (Table 1 and Fig. 3).

In 2020, the distribution of working age population in the rural areas by micro region was, in the descending order: North East 22.6%, South Muntenia 18.5%, North West 13.5%, South East 13%, South West Oltenia 10.9%, Center 10.9%, West 8% and Bucharest Ilfov 2.6% (Fig. 4).
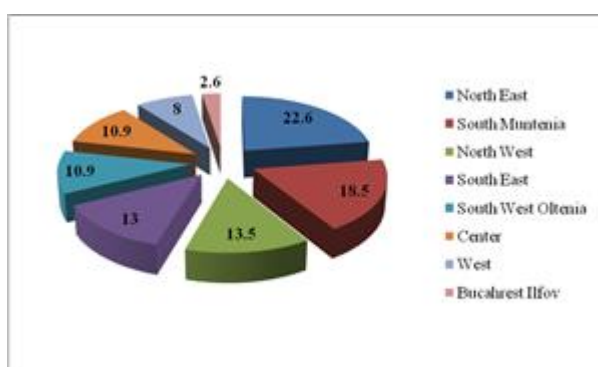

Fig. 4. The distribution of rural working age population by region in the year 2020 (%)
Source: Own calculation and design based on NIS data, 2021 [11].

Civil population occupied in agriculture

In Romania, the total civil occupied population declined from 8,747 thousand persons in 2008 to 8,441 thousand persons in the year 2020, meaning - 3.5% less.

Of the total civil occupied population in 2008, 2,407.4 thousand persons were occupied in the field of agriculture, forestry and fishing, meaning 27.5%.
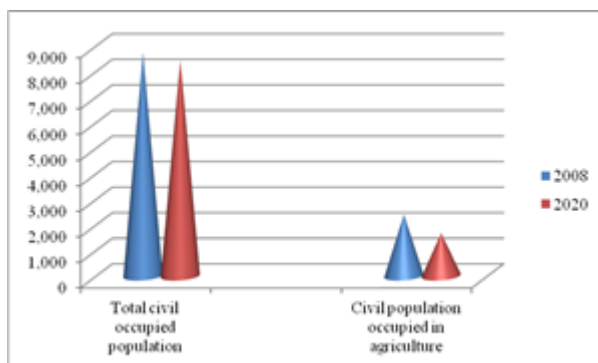

Fig. 5. Civil occupied population in Romania, 2020 versus 2008 (Thousand persons)
Source: Own design based on NIS data, 2021 [11].

In 2020, in this field, the civil occupied population accounted for only 1,681 thousand persons, meaning by 30% less than in 2008, and its share in the total occupied population at the country level decreased to 19.9%, meaning by -7.6 pp less (Fig. 1 and Fig. 5).

In the territory, the situation of civil occupied population by micro-region in the year 2020 versus 2008 is presented in Table 2.

In 2020 versus 2008, the total civil occupied population remained relatively stable in North West and Center regions at the level of 1,187 thousand persons and, respectively, 1,048 thousand persons. In almost all the other regions it registered a decline as follows: by -9% in North East, -10.4% in South East, -8.5% in South Muntenia, -10.1% in South West Oltenia, and -4.4% in West. The only exception was Bucharest Ilfov were it was registered an increase of +10.8%.

Regarding the civil population occupied in agriculture, forestry and fishing, the data from Table 2 showed an important decline in 2020 compared to 2008, as follows: -30.4% in North West, -29.8% in the Center, -31.3% in North East, -29.3% in South East, -30.7% in South Muntenia, -25% in Bucharest Ilfov, -30.3% in South West Oltenia and -28.9% in West.

In consequence, the share of the civil population occupied in agriculture in the total occupied population in the economy decreased in all the micro-regions in the period 2008-2020. In the year 2020 versus 2008, the weight accounted for: North East 30%, South West Oltenia 29.3%, South Muntenia 26.8%, South East 24.3%, North West 21.3%, West 17.4% and Bucharest Ilfov 1.9%.

This reflects a new orientation of the civil population to other fields of activity, the consequence of migration from rural areas to the cities or abroad looking for better paid jobs. However, this is a general trend in many countries not only in Romania.

The highest concentration of the population occupied in agriculture is in North East, South West Oltenia, South Muntenia, South East and North West, all these micro-regions summing over 1,511 thousand persons and the

difference of 170 thousand persons is in the

West and Bucharest micro-regions.

Table 2. Civil occupied population by micro region in Romania in 2020 versus 2008 (Thousand persons)

	2008			2020		
	Total civil occupied population	Civil occupied population in agriculture	% occupied population in agriculture in total	Total civil occupied population	Civil occupied population in agriculture	% occupied population in agriculture in total
North West	1,188	363	30.5	1,187	253	21.3
Center	1,047	242	23.1	1,048	170	16.2
North East	1,249	489	39.2	1,137	336	30.0
South East	1,058	325	30.1	948	230	24.3
South Muntenia	1,201	424	35.3	1,100	294	26.8
Bucharest Ilfov	1,282	36	2.8	1,421	27	1.9
South West Oltenia	867	327	32.7	780	228	29.3
West	856	201	23.5	819	143	17.4

Source: Own calculation based on NIS data, 2021 [11].

The decreasing order of the micro-regions based on their share in civil occupied population in agriculture in the year 2020 is the following one: North East 20%, South Muntenia 17.5%, North West 15%, South East 13.6%, South West Oltenia 13.5%, Center 10.1%, West 8.7% and Bucharest Ilfov 1.6% (Fig. 6).

This order of distribution is similar with the one reflecting the dispersion of the rural working age population by micro-region.
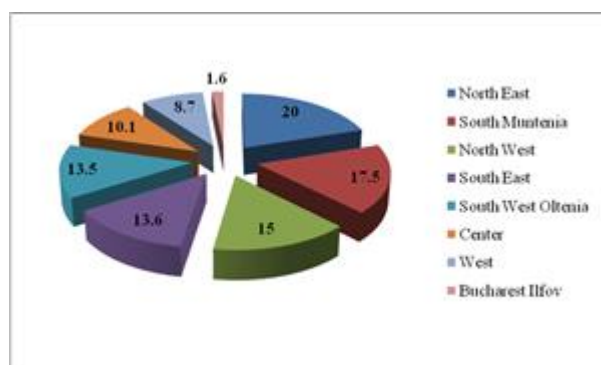

Fig. 6. The distribution of civil occupied population in Romania's agriculture in the year 2020 (%)
Source: Own calculation and design based on NIS data, 2021 [11].

In 2020, from the total rural population accounting for 6,231 thousand persons, only 1,681 thousand persons represented the civil population occupied in agriculture meaning 26.9%.

The rest of the population is below the age suitable to work, either too young or too old, or it is occupied in other sectors of activity.

The share of the population occupied in agriculture in the total rural population is different from a region to another, in 2020, ranging between 33.5% in South West Oltenia and 16.3% in Bucharest Ilfov (Fig. 7).
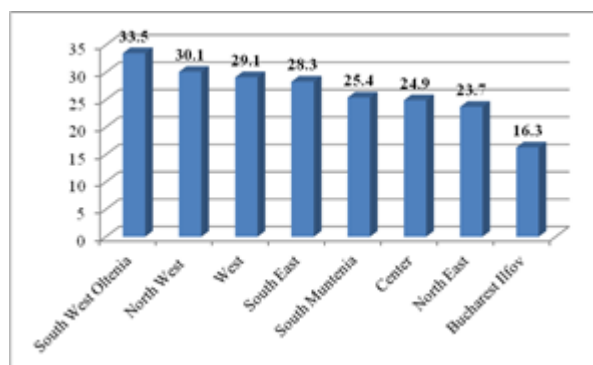

Fig. 7. Share of population occupied in agriculture in rural population in Romania in 2020 (%)
Source: Own calculation based on the data from NIS, 2021 [11].

Agricultural production value

In the analyzed interval, agricultural output value increased from RON 66.99 Billion in 2008 to RON 81.4 Billion in 2020 (Fig. 8).

The value of agricultural production in 2020 compared to 2008 by micro-region is presented in Table 3.
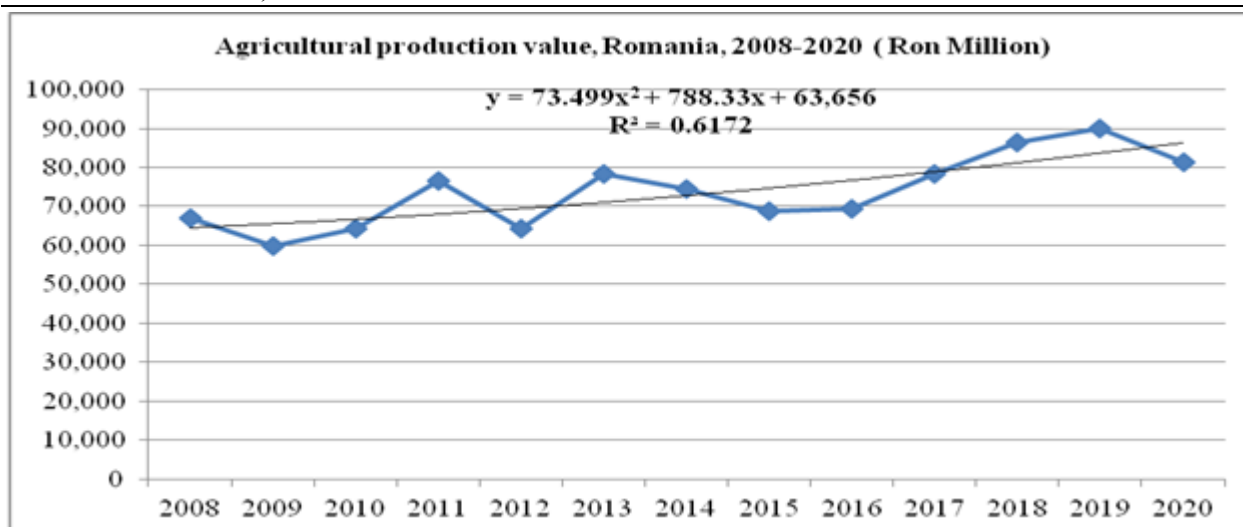
Fig. 8. Dynamics of agricultural production value in Romania, 2008-2020 (Ron Million)
Source: Own design based on the date from NIS, 2021 [11].

The data from Table 3 show that in the studied period, the value of agricultural production increased in all the micro-regions in various proportions.

The highest growth was registered in Bucharest Ilfov +98.8%, South West Oltenia +42.5%, West +37%. A moderate increase was noticed in North West +21.8%, Center +19.9%, South Muntenia +17.5%, North East +15% and the smallest increase of +3.6% in South East area.

Table 3. Agricultural production value by micro-region of Romania in 2020 versus 2008 (RON Million)

	2008	2020	2020/2008 %
North West	9,259	11,285	121.8
Center	8,082	9,690	119.9
North East	11,678	13,432	115.0
South East	10,558	10,940	103.6
South Muntenia	12,164	14,287	117.5
Bucharest Ilfov	727	1,445	198.8
South West Oltenia	7,684	10,947	142.5
West	6,842	9,373	137.0

Source: Own calculation based on NIS data, 2021 [11].

The regions which achieved the highest agricultural production value in the year 2020, in the decreasing order were: South Muntenia, North East, North West, South West Oltenia, South East, summing a value over RON 11,940 Million.

The contribution of the micro-regions to the value of agricultural output in 2020 was the following one: South Muntenia 17.5%, North East 16.5%, North West 13.8%, South West Oltenia 13.4%, South East 13.4%, Center 11.9%, West 8.8% and Bucharest Ilfov 1.7% (Fig. 9).
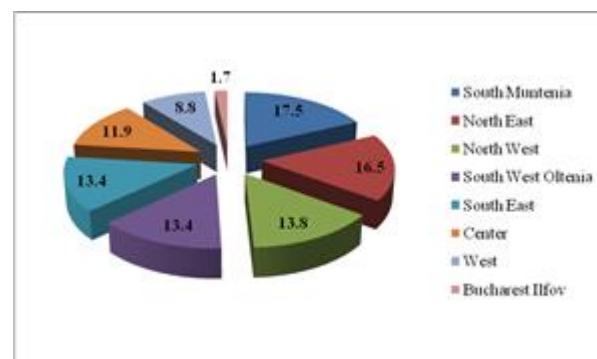

Fig. 9. The contribution of micro-regions to the agricultural output value in 2020 (%)
Source: Own calculation and design based on NIS data, 2021 [11].

Agricultural production value per civil person occupied in agriculture
Regarding this indicator, we may affirm that it registered a substantial increase in all the regions during the analyzed period as shown in Table 4.

In 2008, the decreasing order of the regions based on the level of agricultural production value per civil person occupied in agriculture was as follows: West, Center, South East,

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South Muntenia, North West, North East, South West Oltenia and Bucharest Ilfov.
In 2020, West region remained in the top position, followed by the Central area on the 2nd position. South Muntenia remained on the 4th position, North West passed from the 5th position to the 7th position. South East moved from the 3rd position to the 6th one, North East passed from the 6th position to the 8th one. South West Oltenia climbed from the 7th position to the 5th position. Bucharest Ilfov climbed from the 8th position to the 3rd one.

Table 4. Agricultural production value per civil person occupied in agriculture in Romania in 2020 versus 2008 (RON/Person)

	2008	Rank	2020	Rank	2020/2008 %
North West	25.506	5	44,605	7	174.8
Center	33,396	2	57,000	2	170.7
North East	23,881	6	39,976	8	163.4
South East	32,486	3	47,565	6	146.4
South Muntenia	28,688	4	48,595	4	169.4
Bucharest Ilfov	20,194	8	53,518	3	265.0
South West Oltenia	23,498	7	48,013	5	204.3
West	34,039	1	65,545	1	192.5

Source: Own calculation.

Spearman's non-parametrical correlation coefficient between agricultural production value and civil occupied population in agriculture

First of all, it was built up the scatter plot reflecting the connection between population occupied in agriculture and agricultural production value to check if between the two variables it is a monotonic relationship.
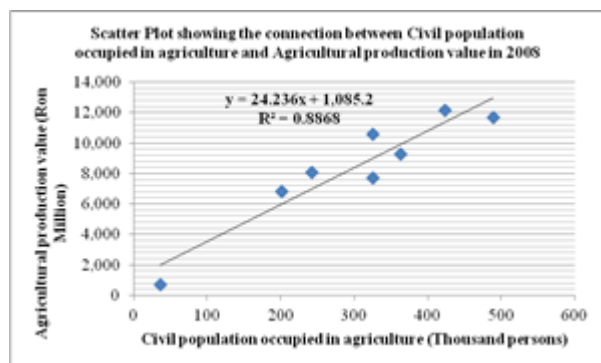

Fig. 10. The Scatter Plot showing the connection between Civil population occupied in agriculture and Agricultural production value in Romania in 2008
Source: Own calculation and design based on NIS data, 2021 [11].

Figure 10 shows that between the two indicators it is such a type of connection as long as the value of one variable increases, so does the value of the other variable.
In this case, running a Spearman's correlation is justified to measure the strength and direction of this monotonic link.
At this moment, it was set up Table 5 for ranking the data for each indicator a presented below. The results showed that in the year 2008, the value of Spearman's correlation coefficient, r_S was 0.1904. Using t-test, the value of R^I accounted for 0.4748 which is smaller than t_{crit} value = 1,943 for 6 degrees of freedom (df= N-2 = 6) and $α$ = 0.05 significance level.
Therefore, Ho: hypothesis was accepted, meaning that there is no linear dependency between the ranks of the two indicators and the value of r_S quotient is considered irrelevant (Table 5).
Figure 11 reflects a monotonic connection between civil population occupied in agriculture and the value of agricultural production in the year 2020. Again, Spearman's correlation was determined to measure the strength and direction of this monotonic link.

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Table 5. Spearman's non parametrical correlation coefficient between civil population occupied in agriculture and agricultural output value in Romania the year 2008

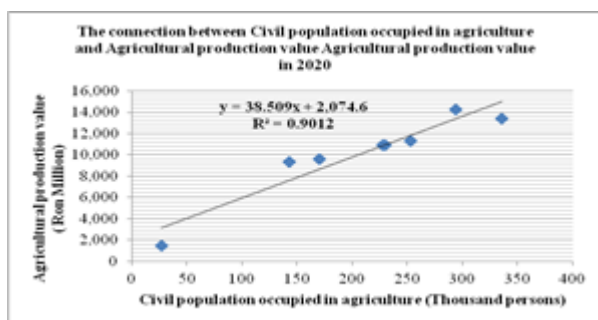|	Civil occupied population in agriculture		Agricultural production value		d_i^2
	Thousand persons	Rank	RON Million	Rank	
North West	363	3	9,259	4	1
Center	242	5	8,082	5	0
North East	489	1	11,678	2	1
South East	325	6	10,558	3	9
South Muntenia	424	2	12,164	1	1
Bucharest Ilfov	36	8	727	8	0
South West Oltenia	326	4	7,683	6	4
West	201	7	6,842	7	0
					$\Sigma d_i^2 = 16$
$r_S = 0.1904$					
$R^I = 0.4748$					
$t_{crit\ 6;\ 0.05} = 1.943$					
Therefore, $R^I < t_{crit} = 0.4748 < 1.943$ ......H_0 is accepted.					

Source: Own results.

Fig. 11. The Scatter Plot showing the connection between Civil population occupied in agriculture and Agricultural production value in Romania in 2020
Source: Own calculation and design based on NIS data, 2021 [11].

In the year 2020, the value of r_S accounted for 0.739, the value of R^I was equal to 2.26 and comparing it with $t_{crit\ 6;\ 0.05} = 1.943$, we may easily notice that the calculated value is higher than the critical one in t-table for a = 0.05.

In consequence, in this case, H_0: hypothesis is rejected and H_1: hypothesis is accepted, meaning that it is a liner dependency between the two variables and r_S quotient is considered relevant (Table 6).

Table 6. Spearman's non parametrical correlation coefficient between civil population occupied in agriculture and agricultural output value in Romania the year 2020

	Civil occupied population in agriculture		Agricultural production value		d_i^2
	Thousand persons	Rank	RON Million	Rank	
North West	253	2	11,285	3	1
Center	170	6	9,690	6	0
North East	336	1	13,432	2	1
South East	230	3	10,940	5	4
South Muntenia	294	5	14,287	1	16
Bucharest Ilfov	27	8	1,445	8	0
South West Oltenia	228	4	10,948	4	0
West	143	7	9,373	7	0
					$\Sigma d_i^2 = 22$
$r_S = 0.739$					
$R^I = 2.26$					
$t_{crit\ 6;\ 0.05} = 1.943$					
Therefore, $R^I > t_{crit} = 2.26 > 1.943$ ......H_0: is rejected, and H_1 is accepted.					

Source: Own results.

Hierarchy of the micro-regions based on the method of relative distance from the highest performance

Using this method of relative distance from the top performance, the hierarchy of the

micro-regions in the year 2020 versus the one in 2008 is comparatively presented in Table 7. We may notice that the micro-regions, which remained on the same position regarding their performance in agricultural production value in 2020 versus 2008, were South Muntenia (1st position), North East (2nd position), West (7th position) and Bucharest Ilfov (8th position). In 2020, South East region passed from the 3rd position to the 5th position, North West moved from the 4th position in 2008 to the 3rd position in 2020. the Central area passed from the 5th position to the 6th one and South West Oltenia jumped from the 6th position to the 4th one.

Table 7. Hierarchy of the micro-regions based on the relative distance method from the highest performance in 2020 versus 2008

	2008	2020
1	South Muntenia	South Muntenia
2	North East	North East
3	South East	North West
4	North West	South West Oltenia
5	Center	South East
6	South West Oltenia	Center
7	West	West
8	Bucharest Ilfov	Bucharest Ilfov

Source: Own results.

CONCLUSIONS

This study pointed out that in the period 2008-2020, in Romania it is still a high labor resource accounting for 6.23 million persons in the last year, being by 10% higher than in the first year of the analysis.

In the territory, while the population able to work declined in the analyzed interval in almost all the regions, except North East and Bucharest Ilfov, the rural population having the age to work increased by +10% in North West, +10.5% in the Central area, +16.8% in North East, +7.7% in South East, +3.7% in South Muntenia, +53.9% in Bucharest Ilfov, +3.8% in South West Oltenia, +13% in the West region.

The civil population occupied in agriculture declined in 2020 compared to 2008. In 2020, it accounted for 1,681 thousand persons being by -30.2% smaller than 2,407 thousand persons in 2008.

This was caused by aging and migration to the urban areas and abroad. the decline in the territory was in various proportions ranging between -31.3% in North East and -25% in Bucharest-Ilfov.

As a result, the share of the civil population occupied in agriculture also decreased, in 2020 varying from 30% in North East to 1.9% in Bucharest Ilfov.

Agricultural production value increased by +21.5% at the country level due to the contribution of all the regions. It was registered a higher output value whose growth rate ranged between +98.8% in Bucharest Ilfov and 3.6% in South East.

In 2020, the highest level of agricultural production value was achieved in South Muntenia, North East, North West, South West Oltenia, South East, all together these five regions contributing by over Ron 11,940 Billion to the national agricultural output value.

In 2008, it was not found any linear dependency between the ranks of civil population occupied in agriculture and the value of agricultural production, as r_S = 0.1004, and $t_{crit\ 6;0.05}$ was 1,943 and R^I = 0.4748 < 0.1943. Therefore, H_1: hypothesis was accepted.

In 2020, it was accepted H_0: hypothesis meaning that between the ranks of the two studied indicators is a linear dependency as r_S = 0.739, R^I = 2.26, $t_{crit\ 6;0.05}$ was 1,943, therefore R^I > t_{crit}.

The relative distance from the highest performance in agricultural production value allowed to set up the hierarchy of the micro-regions which in 2020 was the following one: South Muntenia, North East, North West, South West, South West Oltenia, South East, Center, West and Bucharest Ilfov.

Taking into account the agricultural production value per civil person occupied in agriculture, in 2020, the highest level was carried out by West region, accounting for Ron 65,545 and the lowest level was Ron 39,976/person in North East region. Compared to 2008, in 2020, the level of this indicator increased in large proportions varying between +165% in Bucharest Ilfov and +46.4% in South East.

Therefore, while the population occupied in agriculture declines, agricultural production value increases due to the following factors of influence:

- the decline in civil population occupied in agriculture caused by aging and migration;

-the increased performance in agricultural production in the both sectors, vegetal and animal, sustained by technological progress and a better farm management;

-price volatility for agricultural products;

-intermediary consumption;

-subsidies and aids offered according to the EU CAP and Government.

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